MICRO CASE 8 --- Haemophilus influenzae (acute exacerbation of chronic bronchitis- AECB)

A 64-year old man presented to a clinic with complaints of low-grade **fever, productive cough of yellow-green sputum,** and worsening of his **chronic shortness of breath** for several days. He had recovered from a mild cold just before the current symptoms began.

He had a **long history of COPD** and had been on home oxygen for the past 2 years. He had been taking his inhalers as directed.

* PHYSICAL EXAM:
  + Wheezes and rhonchi
* DIAGNOSTIC WORK UP
  + Order Gram stain and cultures of sputum. Also order blood cultures (though note that blood cultures are often negative in AECB)
  + Imaging revealed hyperinflated lungs but no infiltrates
  + On chocolate agar, see colonies around XV (dependent on both)
* DIFFERENTIAL:
  + Adenovirus, Haemophilus influenzae, Influenzae A or B virus, Moraxella catarrhalis, parainfluenze virus, streptococcus pneumoniae
  + Rationale: A clinical diagnosis of AECB should be considered. While many organisms can cause AECB, nontypeable H. influenzae and S. pneumoniae make up a large majority of cases. M. catarrhalis is also seen and is indistinguishable from H. influenze. S. pneumoniae is more likely to cause pneumonia. The respiratory viruses are less likely to be productive of sputum.
* Source = Haemophilus influenzae (acute exacerbation of chronic bronchitis- AECB)
* MICROBIOLOGICAL PROPERTIES
  + Small, Gram negative coccobacillary rods
  + Two groups of H. influenzae: **Group 1 = typeable** (has a polysaccharide capsule) and **Group 2 = non-typeable** (no capsule but still has LPS that induces inflammation).
  + **Group** 1 cause most H. influenzae disease in **children** while **Group 2** causes most disease in **adults.**
  + Type b has a polyribitol phosphate capsule and is the major invasive pathogen of this group 1
* MANNER OF EXPOSURE
  + Direct contact with respiratory droplet
* Who is at increased risk?
  + Adults with COPD
  + Heavy smokers
  + Those in countries without the vaccine (vaccine against type b)
* PATHOGENESIS
  + Three bacterial species commonly found in those with COPD: (1) H. inlfuenze (2) S. pneumoniae (3) Moraxella catarrhalis.
  + Both tyeable and non-typeable have IgA protease
  + **Non-typeable (Group 2) can spread with help of IgA protease from nasopharynx into the bronchi to cause acute exacerbations of COPD, particularly chronic bronchitis, a condition associated with excessive tracheobronchial mucus production sufficient to cause cough with expectoration for a period of at least 3 months (hypertrophy of mucus-production glands).**
* Treatment
  + For non-typeable Group 2, usually macrolides and cephalosporins
  + For type b, parenteral administration of 3rd generation cephalosporin (e.g. ceftriaxone or cefotaxime)
  + Very effective vaccine against type b exist in many countries (dramatic reduction in meningitis in children)